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10 **WASHING AID DISPENSER AND WASHING MACHINE COMPRISING**  
**SAID DISPENSER**

**DESCRIPTION**

15 The present invention refers to a dispenser of washing products and aids, such as detergents or whiteners, fabrics softeners, scents and similar aids, for use in connection with a washing machine, such as a clothes washing machines.

20 It is largely known that these products and substances are poured by the user into the specially provided compartments of the dispenser before the machine is started, and are thereafter introduced from such a dispenser into the washing tub of the machine at pre-established times and phases of the washing cycle being performed. Currently used  
25 detergent dispensers are generally provided as a single-piece component part comprising at least two distinct compartments adapted to receive and hold washing powders or liquids on the one side and, on the other side, generally liquid rinsing aids. For transferring liquid substances from the dispenser into the washing tub of the machine, one or more siphons are  
30 usually provided within the compartment or compartments containing such substances; the inflow of water into the dispenser in the phase of the washing cycle that calls for liquid substances to be introduced in the washing tub causes, upon reaching the necessary water head, the siphon

to be triggered, i.e. primed into working and, as a result, the liquid detergent substance to be drawn in from the dispenser towards the washing tub duly mixed with the inflowing water.

5 DE 37 14 301 A1 discloses a plurality of syphon blocks, formed from a small standpipe and a cap, arranged in a washing-agent flush-in tray in such a way that, if one syphon fails to suck up the mixture consisting of washing-agent and water, the other syphons continue to work.

10 A typical drawback which is encountered with currently used types of dispensers lies in the fact that the siphon must work with liquids of different densities (water and liquid washing aid, e.g. a fabric softener), which do not mix up very well, i.e. homogeneously together, but, owing to the flow pattern that is brought about inside the dispenser, tend to rather  
15 take a stratified or layered form, without any clear separation between water and washing substance. Such a layer-forming mixing of water and washing aid causes the siphon to work in a discontinuous manner, in which water is drawn in preferentially with respect to the washing aid. As a result, it quite often occurs that, upon conclusion of the washing cycle  
20 performed by the machine, remnants of the denser washing aids or products, such as for instance the fabric softener, can still be found on the bottom of the respective compartments in the dispenser.

Such a drawback might be overcome through an increase in the inflow  
25 pressure of the water supplied to the dispenser, but this would unavoidably give rise to excessive frothing during mixing with the liquid detergent substance so as to anyway cause the siphon to work irregularly or, in the worst case, lead to suds flowing over the dispenser and cause a lot of inconvenience.

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Another possible solution in this connection lies in increasing the negative pressure generated by the siphon so as to obtain a greater draw-in capability. This solution, however, implies an increase in the overall size

of the siphon and, as a result, it turns out to be scarcely practicable due to construction-related limitations imposed by the machine requiring extremely reduced sizes in general.

- 5 It therefore is a main purpose of the present invention to do away with

the above-mentioned drawbacks of prior-art solutions by providing a washing aid dispenser for washing machines, which is capable of working in an optimum manner with liquids of different densities, even if they do not mix up homogeneously together inside the dispenser itself.

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Within such a general scope of the invention, a further purpose is to provide a washing aid dispenser which is capable of ensuring complete removal, i.e. suction of the liquid washing substances into the washing tub of the machine during pre-determined phases of the washing cycle, as well as complete removal of any remnant of said washing substances from the bottom of the respective compartments in the dispenser at the end of the washing cycle.

Another major purpose of the present invention is to provide a washing aid dispenser which is capable of reaching the above specified aims in a manner that is fully reliable and safe for the user, in particular without giving rise to any excessive frothing, i.e. formation of foam inside the dispenser itself.

A further major purpose yet of the present invention is to provide a washing aid dispenser which is capable of reaching the above specified aims while keeping sizes and space requirements in general unaltered or, anyway, substantially within due limits, so as to meet the construction-related limitations imposed by the machine.

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A last, but not least purpose of the present invention is to provide a washing aid dispenser which is low in costs and capable of being manufactured with the use of existing, readily available materials, techniques and machinery.

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According to the present invention, these aims and advantages, along with further ones that will become apparent from the following description, are reached in a washing aid dispenser for washing machines

incorporating the characteristics as recited and defined in the appended claim 1.

Anyway, features and advantages of the present invention may be more readily understood from the description of some preferred, although not sole embodiments that is given below by way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 1 is a schematic front view of a washing machine incorporating the washing aid dispenser according to the present invention;

- Figure 2 is a longitudinal-sectional view of a first embodiment of washing aid dispenser according to the present invention;

- Figure 3 is a view similar to the one illustrated in Figure 2 of a second embodiment of washing aid dispenser according to the present invention.

With reference to Figure 1 cited above, the reference numeral 1 is used to generally indicate a washing machine, such as a clothes washing machine, incorporating a washing aid dispenser 2, which is adapted to be pulled out of the main body of the washing machine 1 itself so as to enable the user to fill the detergent substances, such as washing powders or liquids, fabric softeners, whiteners, scents and similar aids, into the respective compartments before starting the washing machine to go through the selected washing cycle.

The washing aid dispenser 2 comprises at least a compartment 3 adapted to contain detergent substances, in particular such aids as fabric softeners, which is in communication with water supply means 4 adapted to deliver water coming from the machine 1. These water supply means 4 are provided with a water inlet conduit 5, through which the water, in certain phases of the washing cycle, is let into a chamber 6 and, through a plurality of apertures 7, is able to flow into the dispenser 2 so as to mix up

with the detergent substance contained inside the dispenser itself and, thereafter, convey the resulting mixture towards the washing tub of the machine 1. The arrows A and B indicate the flowpath followed by the water, whereas the water+softener mixture is conveyed into the washing  
5 tub along the path indicated by the arrow C.

The washing aid dispenser further comprises a first siphon 8 adapted to draw in the above mentioned mixture from the dispenser and convey it towards the washing tub of the machine. In the exemplified embodiment,  
10 such a siphon is formed by a first conduit 9, which is open at both its opposite ends and is associated to a first cap piece 10 situated thereabove. The suction, i.e. drawing-in action starts as soon as the water flowing into the dispenser 2 reaches the level, i.e. the head required to prime or trigger the siphon 8 into working, said level or head being defined by the distance  
15 of the inner summit 11 of the first cap piece 10 to the bottom 12 of the dispenser 2; the suction height  $h$  is on the contrary defined by the distance of the base of the first cap piece 10, or the mouth, and the bottom 12 of the dispenser 2.

20 A peculiar feature of the present invention lies in the fact that the washing aid dispenser 2 is provided with at least a second siphon 14, which is in turn formed by a second conduit 15 which is open at both ends thereof and is associated to a second cap piece 16 situated thereabove. This second siphon 14 has a suction height  $H$  that is  
25 differentiated with respect to the suction height of the first siphon 8. With reference to the particular embodiment illustrated in Figure 2, the suction height  $H$  of said second siphon 14 is greater than the suction height  $h$  of said first siphon 8.

30 Advantageously, even the level or height of the water head of the second siphon 14 may be selected to be greater than the one of the first siphon 8 and, possibly, also the diameter of the second conduit 15 may be selected to be larger than the diameter of the first conduit 9.

According to a preferred embodiment of the present invention, which is exemplified in the illustration appearing in Figure 2, there may be also provided a third siphon 17, formed again by a third conduit 18 and a third cap piece 19 arranged thereabove. Said third siphon 17 has a suction height  $H'$  that is greater than the suction height  $H$  of said second siphon 14; the level of the water head in said third siphon 17 may be substantially equal to the one of the second siphon 14, as illustrated in Figure 2, or even higher than that. It has in fact been found experimentally that such a contrivance proves effective in enabling the siphons 8, 14, 17 to be primed, i.e. triggered into working in a sequence, thereby improving the overall operation and efficiency during suction; in particular, this is effective in avoiding the risk that two contiguous siphons may unprime or deactivate each other.

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The operation is as follows: as soon as the water is let into the washing aid dispenser 2 through the apertures 7, it starts to mix up with the fabric softener, or such other washing aid as may be actually present in the same dispenser, and to form the afore mentioned stratified water+softener mixture. When the water level rises above the inner summit 11 of the first siphon 8, the latter is primed, i.e. triggered into working, and the water+softener mixture starts to be drawn-in and conveyed towards the washing tub of the machine. As the water level continues to rise, even the second siphon 14 and, if provided, the third siphon 17 are primed and triggered into working. The suction action of these siphons takes place at different levels of the washing aid dispenser 2, so that the various layers of the above mentioned stratified water+softener mixture that lie at different heights in the dispenser 2 are thereby able to be effectively drawn in and conveyed into the washing tub.

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From the above description it can therefore be readily appreciated that the washing aid dispenser according to the present invention is actually able to fully reach the afore stated aims and provide the desired

advantages: in fact, the provision of an additional siphon having a different suction height with respect to said first siphon 8 (or draining siphon) enables the stratified water+softener mixture to be drawn in at different heights with respect to the bottom 12 of the dispenser 2, so that  
5 the problem connected to such a stratification of the mixture owing to the different densities of the two liquids can be effectively overcome.

In this manner, both suction and conveyance of the mixture occur in an optimum manner, notwithstanding the lack of homogeneity of the  
10 mixture itself, thereby ensuring both full suction of the fabric softener during the appropriate phase of the washing cycle and full removal of any residue thereof from the bottom of the dispenser. Conclusively, the twofold advantage is achieved of a more rational and efficient utilization of the detergent substances and an enhanced cleanliness of the washing aid  
15 dispenser.

It should furthermore be noticed how the initially proposed advantages are actually achieved by keeping the operating pressures of the water and the overall size of the dispenser substantially unaltered.  
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It shall be appreciated that the above described washing aid dispenser may be the subject of a number of modifications and variants without departing from the scope of the present invention.

25 So, for instance, Figure 3 can be noticed to illustrate a second embodiment of a washing aid dispenser 102 according to the invention, which comprises at least a compartment 103 that is adapted to receive and hold detergent substances and is in communication with water supply means 104; these water supply means comprise a water inlet  
30 conduit 105, a chamber 106 and a plurality of apertures 107, through which the water is able to flow into the dispenser 102 so as to mix up with the detergent substance contained therein and then flow out of the dispenser and into the washing tub of the machine.

This washing aid dispenser further comprises a first siphon 108, which is similar to the first siphon 8 discussed above in connection with the first embodiment considered, and which therefore comprises a first conduit  
5 109 that is open at both the extremities thereof and is associated to a first cap piece 110 lying thereabove and defining a suction height  $h$ .

The washing aid dispenser 102 is additionally provided with at least a second siphon 114 comprising a second conduit 115 and a second cap  
10 piece 116; the latter has a base 120 that forms a pre-defined angle with respect to the bottom 112 of the dispenser 102: a suction height is thereby defined which is longitudinally variable along the dispenser 102, in such a manner as to substantially obtain a first suction zone F extending not only in the horizontal plane, but also in the vertical one.

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In an advantageous manner, said first suction zone F defined by the base 120 of the second cap piece 116 starts from a lower level that is equal to or slightly higher than the suction height  $h$  of said first siphon 108 and continues with a pre-determined inclination; furthermore, the  
20 height of the water head of said second siphon 114 will preferably be greater than the one of the first siphon 108 and, possibly, even the diameter of the second conduit 115 may be selected to be larger than the diameter of the first conduit 109.

Advantageously, there may be further provided a third siphon 117 comprising a third cap piece 119 whose base 121 forms a pre-defined angle with respect to the bottom 112 of the dispenser 102, so as to define a second suction zone F' differentiated from and lying at a higher level than said first suction zone F defined by said second siphon 114.

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It should be specially stressed how this second embodiment of the dispenser according to the present invention, further to achieving the afore specified advantages, proves particularly efficient and advantageous

as far as the suction of the poorly homogeneous, stratified mixture is concerned. In fact, the particular configuration of the siphons enables a substantially continuous suction zone to be obtained, formed by said first and said second suction zones F and F' and covering substantially most of  
5 the height dimension of the dispenser 102. This is very effective in bringing about a sensible improvement in the suction capability of the siphons for a complete removal of both the water+aid mixture and any residue thereof from the dispenser itself.

10 It will of course be also appreciated that the materials used to implement the dispenser of the present invention, as well as the shape, form and size of the individual component parts thereof may be from case to case selected to most appropriately comply with particular needs and requirements without departing from the scope of the present invention.